



# Spatial Informatics Group



## Forest carbon market overview

Thomas Buchholz, Ph.D.

Presentation to:

**Montana Forest Products Roundtable**

DNRC Office Missoula MT, December 9 2016









North  
America

Europe

Asia

Africa

South  
America

Australia

# Vision & Mission

## Vision

Create an economic system where the true value of natural assets are incorporated into the goods and services we depend upon.

## Mission

- **Research:** Developing and applying the scientific foundation to link economic and environmental interests by accounting for the full value of natural assets.
- **Applied Programs:** Integrates the science of ecosystem services with tools, policies, and management decision-making.
- **Outreach:** Make science accessible to decision makers and the marketplace in an actionable format.





Forests Carbon Offsets



Forestry and Agriculture



Ecosystem Services



Natural Hazards



Climate Change



Sustainable Cities





# Forest Carbon Team



Gary Roller, M.S.



Bill VanDoren, M.S.



Jeremy Broadhead, M.S.



Paul Lilly, Ph.D.



Christiana Darlington



Bill Keeton, Ph.D.



Travis Freed, M.S.



Thomas Buchholz,  
Ph.D.



Charles  
Kerchner, PhD



David Saah, Ph.D.



SIG background

Development process

Opportunities

# Forest carbon & forestry services

- Protocol development & ARB tools
- **Origination & project feasibility assessments**
- **Soup-to-nuts project development**
  - Inventory design & onsite inventory
  - GIS & mapping
  - Growth & yield modeling
  - Harvest schedules
  - Linear optimization modeling
  - Verification guidance
  - Offset Project Data Report (OPDR)
- Forest biometrics
- Valuation & financial analysis – cash flow & NPV/IRR calcs

## **Measuring, Reporting, & Verification (MRV)**



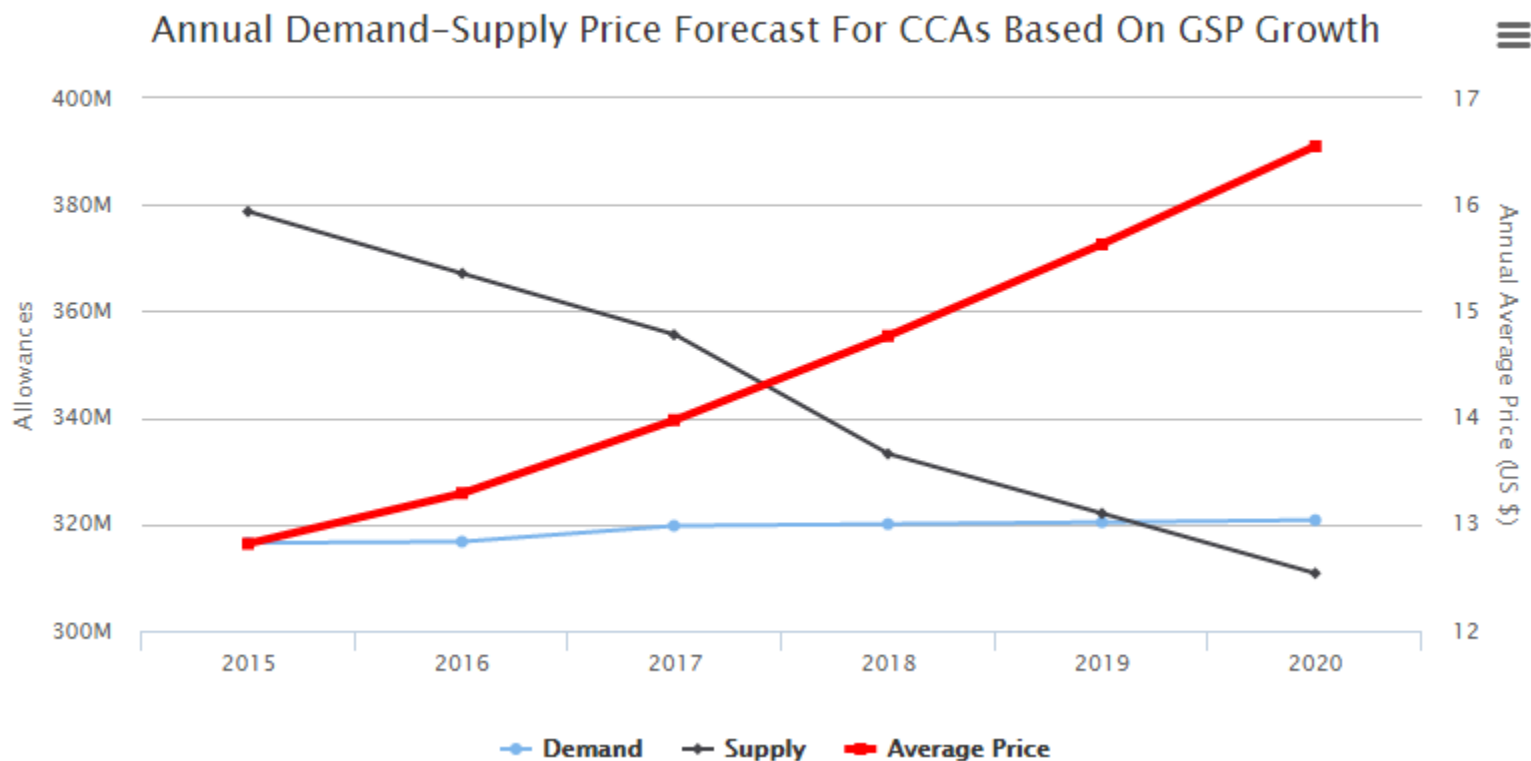
# California market

- 2006 signed AB 32 to reduce California's GHG emissions to 1990 levels by 2020.
- Capped entities can meet 8% of compliance obligation with offsets from uncapped sector.
- Demand for offsets are expected to range from 150-220 million tonnes worth \$2 to \$8 billion by 2020.
  - Market at 15.5 million ARBOCs. 24 million credits needed to meet full 8% demand for CP1.
- Current value is ~\$11 per California Compliance Offset. Price will increase as the cap decreases.
- Recently harmonized with Quebec Compliance Market.



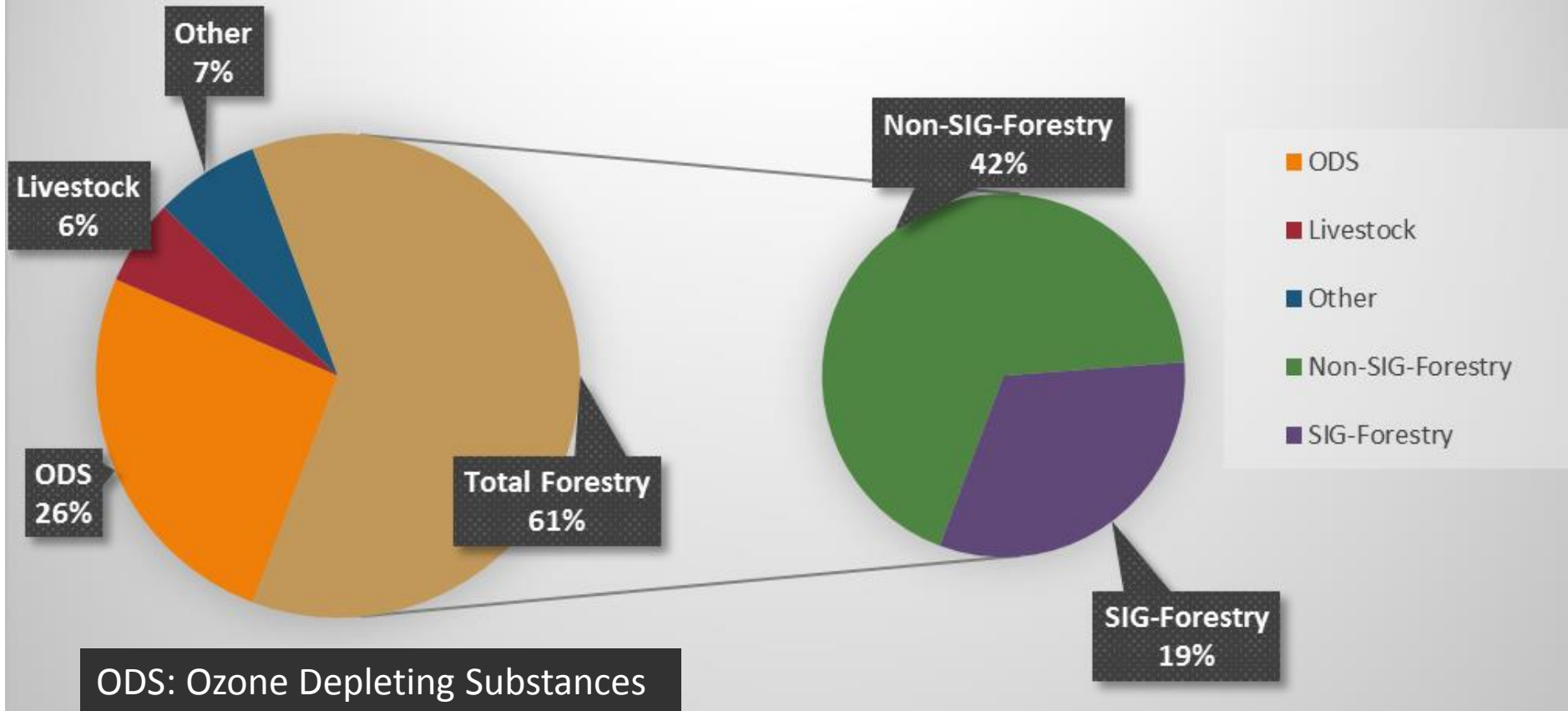


# California supply/demand projections for allowances



# California carbon market

~51 million total credits

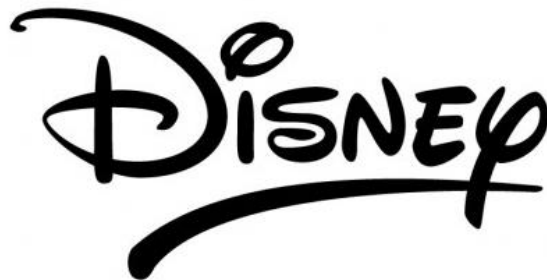


# Who buys the offsets?

## California regulatory buyers



## Voluntary market buyers





# SIG forest carbon client examples

undisclosed



undisclosed



NORTHEAST WILDERNESS TRUST

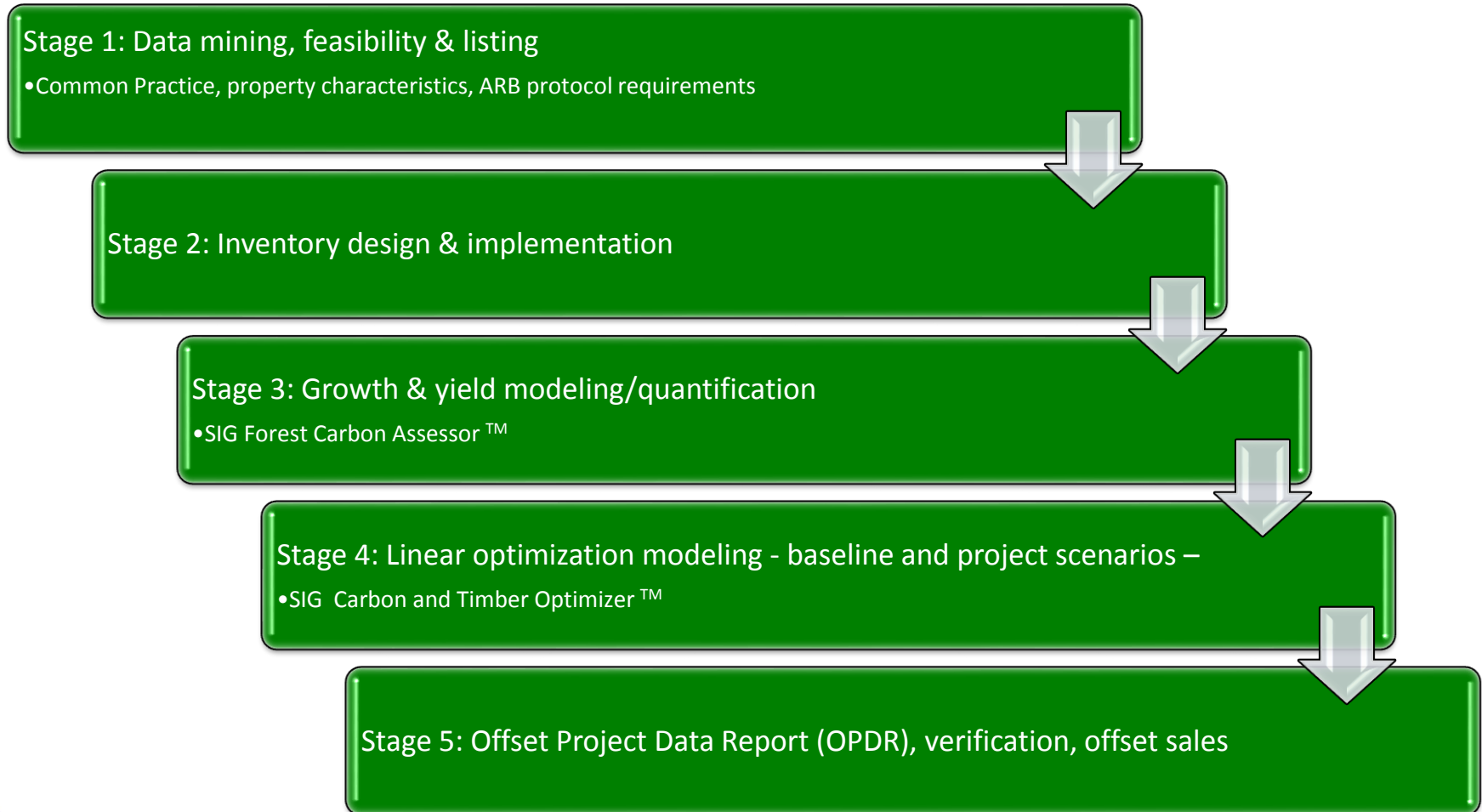


# How many forest carbon projects has SIG developed?

Market/Standard	Number of projects developed	Initial Credits at Registration	Annual Credits	Acres
Regulatory - Air Resources Board	10	8,309,754	349,000	510,918
Voluntary - Verified Carbon Standard and Plan Vivo	3	47,000	35,100	22,500
TOTAL	13	8,356,754	384,100	533,418



# SIG carbon project development process





# Stage 1. Data mining, project feasibility & listing

- Assess property characteristics

- Stocking
- Size
- Forest type

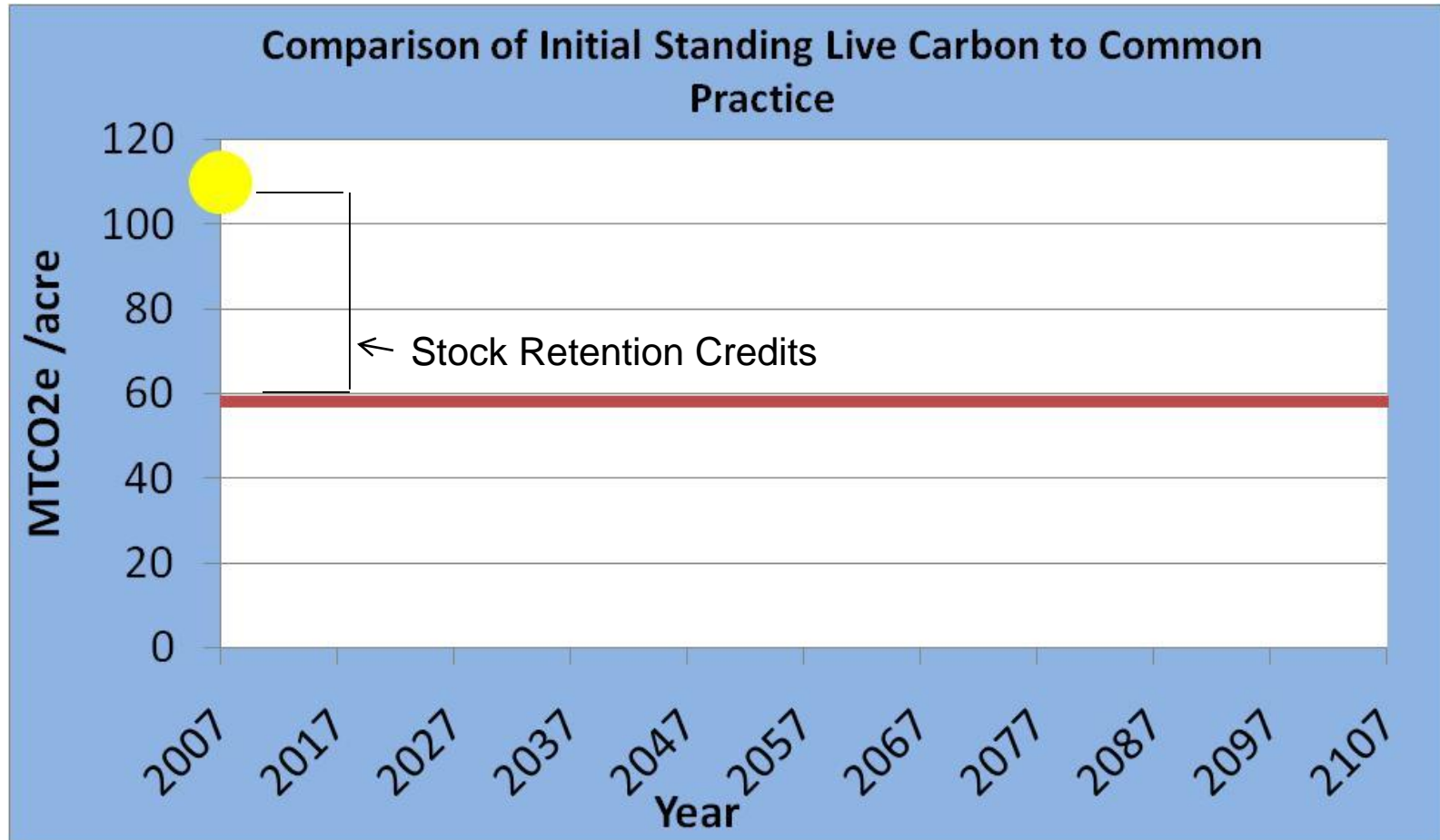
How property characteristics intersect with ARB forest protocol

- Stratification & Project Area (e.g. carbon 'hotspots')
- Common Practice (Species composition, TPA, or FIA algorithm)
- Start date (backcasting)
- Legal constraints
- Future management
- Consider reversals & invalidation (spread risk across multiple projects)

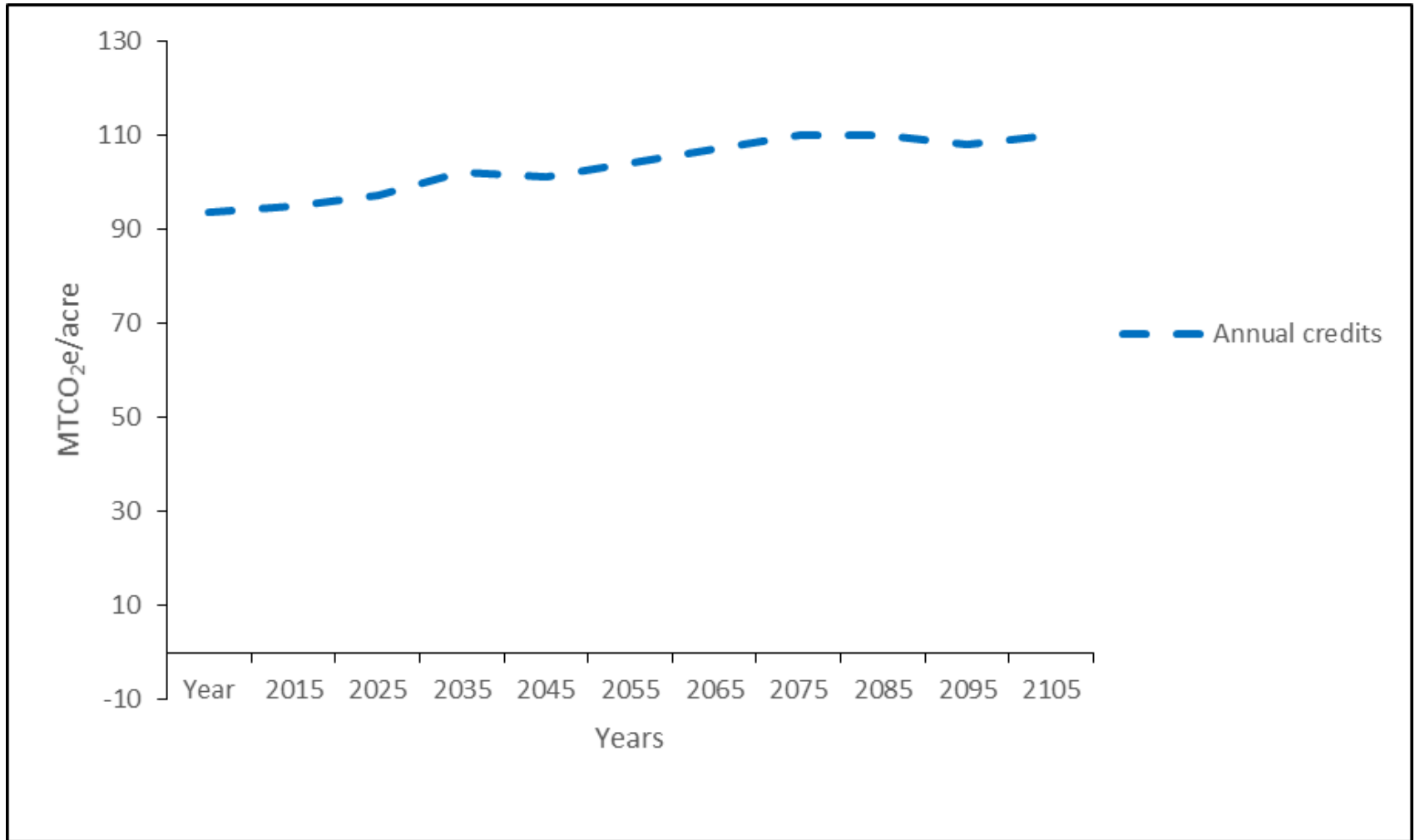


# Stage 1. Data mining, project feasibility & listing

- Assessment of Initial Standing Live Carbon to Common Practice



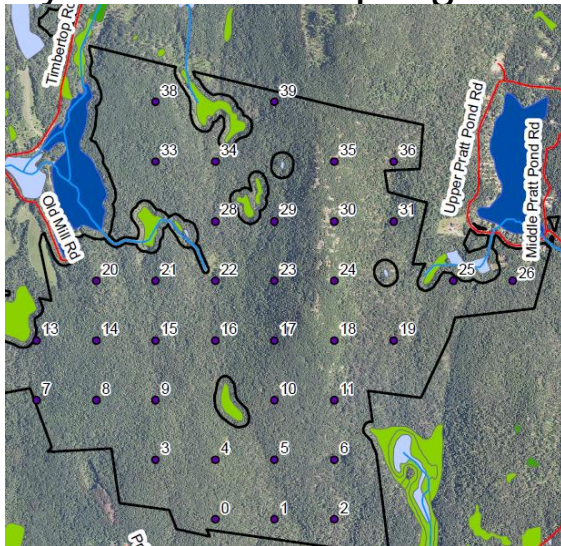
# Annual growth credits





# Stage 2. Inventory

## Systematic Sampling



## Plots



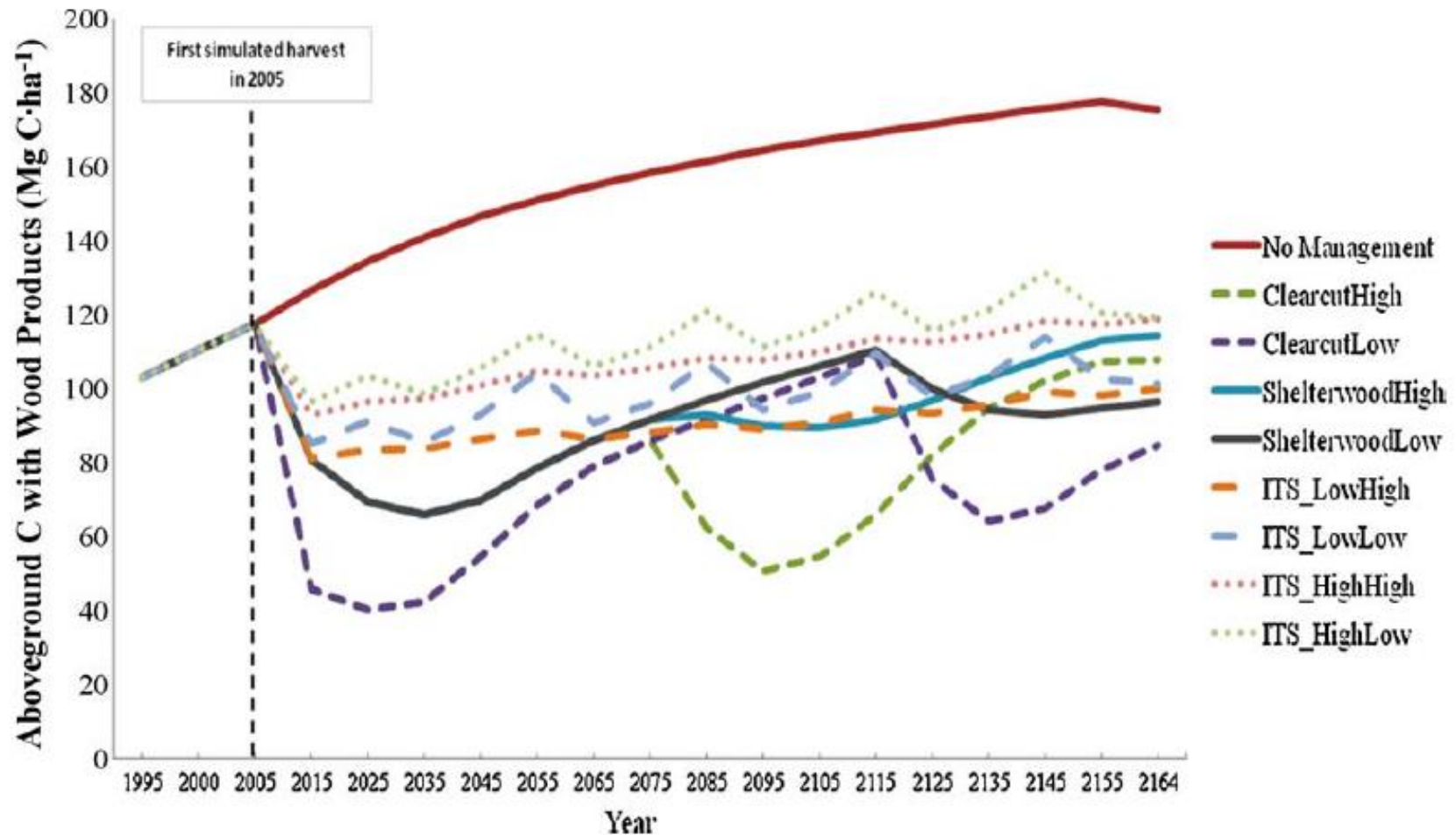
## Carbon Pools



## QA/QC

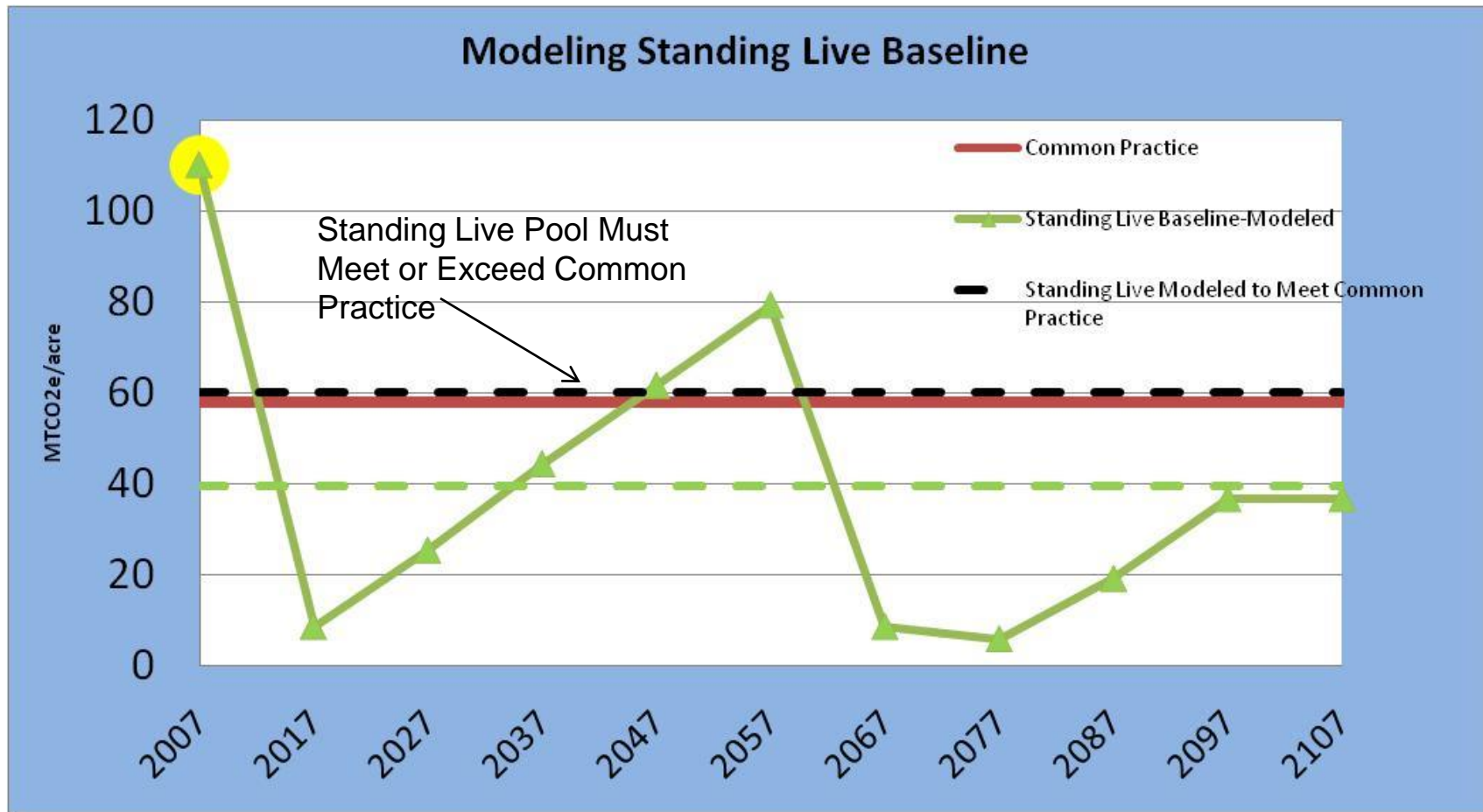


# Stage 3. Growth and yield modeling



Nunery & Keeton, 2010

## Stage 4. SIG Carbon and Timber Optimizer™





# Stage 4 & 5. Offset Project Data Report (OPDR), verification & offset sales

State of California  
California Environmental Protection Agency  
California Air Resources Board  
**U.S. FOREST OFFSET PROJECT DATA REPORT**  
**INITIAL REPORTING PERIOD - IMPROVED FOREST MANAGEMENT**

## **U.S. FOREST OFFSET PROJECT DATA REPORT** **INITIAL REPORTING PERIOD - IMPROVED FOREST MANAGEMENT**

*Project Operators submitting the project's first Offset Project Data Report must submit both the **Initial Reporting Period** and the **Annual Reporting** forms to the appropriate offset project registry. For every reporting year thereafter, submit only the Annual Reporting Period form.*

ARB GHG ID	Facility Name	NAICS Code and Description
2017	BNP Paribas Energy Trading GP	221122 - Electric Power Distribution
2027	Merrill Lynch Commodities, Inc.	425110 - Business to Business
2044	Bonneville Power Administration - Marketer	221111 - Hydroelectric Power Generation



# Landowner commitment

- Forest owners must monitor and verify a forest project for 100+ years.
- Initial site verification.
- Site-visit verification every six years.
- Monitoring - annual reports.
- Can harvest.



# Market risk

Policy assumption	Project response	Effect on long-term monitoring cost
1. AB 32 is renewed post 2020 and 100 year monitoring is required.	Project crediting period and sale of credits continues past 2020 and a "Reserve Fund" is established to pay for 100 monitoring costs.	Conservative assumption assumes 100 year monitoring costs. A "Reserve Fund" of \$200,000 is established with sale of credits, interest accrues during crediting period and fund is dispersed over 100 year monitoring post last year of credit sale.
2. AB 32 is not renewed post 2020, but there is a mandate to monitor for 100 years.	Project "buys its way out" by purchasing credits at reduced rates in 2020 to replace 100 year monitoring obligation.	AB 32 terminates and credits are purchased in 2020 at 10% value of original sale price to replace long-term monitoring obligation.
3. AB 32 is not renewed post 2020 and there is no obligation to monitor 100 years.	Since legislation is terminated so is the obligation of a project to monitor long-term.	Long-term monitoring cost is zero.

Kerchner, C., & Keeton, W. 2014. *Forest Policy & Economics*



# Opportunities

- A closely regulated market and floor price for allowances has created a consistent price signal.
- California's market is one of the largest sources of finance for forest conservation in the next 5-7 years.
- Can maximize timber and carbon value.
- Works well on well stocked timberland > 3,000 acres and not planning to harvest more than net growth.







# Spatial Informatics Group



## Thank you!

**Charles Kerchner, Ph.D.**

Web: [sig-gis.com](http://sig-gis.com)

Email: [ckerncher@sig-gis.com](mailto:ckerncher@sig-gis.com)

Phone: 802-999-6986

**Thomas Buchholz, Ph.D.**

Web: [sig-gis.com](http://sig-gis.com)

Email: [tbuchholz@sig-gis.com](mailto:tbuchholz@sig-gis.com)

Phone: 802-881-5590